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APPLICANTS: Peter B. Evans and Steven E. Schumer

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TITLE: Assessing Distributed Energy Resources For The Energynet

EXAMINER: Suzanne Lo

GROUP ART UNIT: 2128

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REPLY BRIEF

This Brief is in reply to Examiner's Answer mailed March 17, 2009.

Arguments

In the Examiner's Answer mailed on March 17, 2008, responsive to the Appeal Brief filed on December 5, 2008, the Examiner restates the rejections set forth in the Final Office Action of May 21, 2008. As the Appeal Brief filed on December 5, 2008, fully addresses the deficiencies of these rejections, the new arguments set forth in the Examiner's Answer are addressed below.

To render a claim unpatentable under 35 U.S.C. § 102, a cited reference must disclose each and every limitation in that claim. *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987); *see also* MPEP § 2131. As Optimal Technologies fails to disclose the claimed element of "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," but merely describes a software program capable of performing a variety of analyses of a data set provided to the software program, Optimal Technologies fails to disclose each and every element recited in the claims.

Unlike the claimed invention, which expressly recites "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the

distribution-level buses," Optimal Technologies describes subsequent analysis of a model or data set after its generation, which is distinct from the initial generation of the model or data set. The Aempfast software disclosed on Optimal Technologies is an analytical layer applied to received data that does not generate the model being analyzed, but merely allows use of a variety of techniques to analyze data received from an external source. (page 15, §4.1.1, ¶ 2; page 18, § 5.1, ¶1). The analysis described by Optimal Technologies is distinct from generation of the single mathematical model or generation of any model.

Additionally, in alleging that Optimal Technologies discloses the claimed invention, the Examiner cites page 16 §4.2, the last paragraph of page 27, and page 13 §3, ¶ 5 of Optimal Technologies. However, in these portions, Optimal Technologies merely discloses format conversion of externally-generated data for use with the Aempfast software, possible characteristics of the received data set or model Analyzed using the Aempfast software and possible types of analyses that may performed by the Aempfast software. Optimal Technologies makes no disclosure of formulation or generation of the data set or model being analyzed, much less disclose "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as claimed.

While the analysis methods in Optimal Technologies may allow analysis of multiple types of models, nothing in Optimal Technologies discloses or suggests generating the model being analyzed, much less "generating a single mathematical model by integrating the model of

the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as claimed. Rather, Optimal Technologies discloses receiving an external data file describing power network components, analyzing the contents of that data file using load flow analysis and/or the Aempfast software to simulate power network operation and applying an optimizer to the analysis results. (page 15, § 4.1.1, ¶ 2; page 18, § 5.1, ¶1)

The Examiner cites page 13 of Optimal Technologies as allegedly showing "integration of an entire power network with both transmission and distribution level busses within a single model." Examiner's Answer, page 10. However, the cited portion of Optimal Technologies discloses analyzing a system's performance rather than generating the model used to describe the system. Determining how a power network performs under different conditions depends on the model used to represent the power network, and different models may produce different analytical results. Optimal Technologies does not disclose generating the model used for analysis, but discloses applying various analysis techniques to a known model to determine power network performance.

Specifically, the Examiner asserts that the optimization described on page 20 of Optimal Technologies requires "a single mathematical model *based on and generated from* the data file, including both distribution and transmission models." *See* Examiner's Answer, page 12 (emphasis in original). However, the claims do not merely recite "a single mathematical model," but recite "*generating* a single mathematical model *by integrating* the model of the transmission-

level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." (emphasis added) To disclose this claim element, Optimal Technologies must disclose generation of the specific type of single mathematical model recited in the claims, not merely analysis of a received data set.

However, nothing in the cited page 20 or any other portion of Optimal Technologies discloses or suggests generation of a single mathematical model, much less generation of a single mathematical model by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." On the cited page 20, Optimal Technologies summarizes optimization of a power network described by the data set detailed on pages 18-19 without describing generation of the model being optimized. As Optimal Technologies discloses receiving data describing a power network and using this received data to analyze power network performance, no mathematical model is generated by Optimal Technologies. At most, Optimal Technologies provides that the optimized results are produced by applying of the Aempfast software to a received data set which characterizes the power network. No specific type of model is generated by Optimal Technologies, which uses various techniques to analyze different types of received data.

On page 9 of the Examiner's Answer, the Examiner alleges that the Aempfast software referenced by Optimal Technologies "models a power network as a single mathematical model including integrated transmission and distribution models and calculated interdependencies." *See* Examiner's Answer, pg. 9. However, as noted above, the claims recite "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." Hence, the claims do not merely recite the power network model, but specifically recite generating a particular type of single mathematical model to characterize the power network.

Contrary to the Examiner's assertions on page 9 of the Examiner's Answer, the specification provides detailed steps describing generation of the single mathematical model and describing the data used to generate the single mathematical model. For example, paragraphs [0110]-[0117] of the specification and FIG. 2 describe the data and steps used to generate "a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." In the embodiment described by the specification, the single mathematical model is generated by beginning with a dataset including transmission system

elements and adding elements of the distribution feeders of the subject network to the dataset describing the transmission system. Characteristics of the distribution feeders and interconnections are then incorporated into the combined dataset. After integration of the transmission and distribution elements, the single mathematical model is analyzed to determine power network performance. For example, the impact of changes to the single mathematical model, such as addition of resources, is calculated. *See* spec., ¶ [0120].

The Examiner also alleges that using separate models for transmission and distribution modeling, then integrating the models and calculating the interdependencies allows the disparate transmission and distribution models to become a single unified mathematical model. *See* Examiner's Answer, page 10. However, the technique described by the Examiner is unsupported by the disclosure of Optimal Technologies. Nothing in Optimal Technologies discloses, or even suggests, the process described by the Examiner. Nowhere in Optimal Technologies is generation of any model, much less generation of a single mathematical model by "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses" disclosed or even suggested. While Optimal Technologies describes various techniques for analysis of a received data set, there is no disclosure of how the data set is generated, much less generating the data set by "integrating the model of the transmission-level buses with the model of the distribution-level buses." The process of producing a single unified mathematical model described on page 10 of the Examiner's Answer is the Examiner's

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own posturing, unsupported by any portion of Optimal Technologies, which merely analyzes a supplied data set using various analysis techniques, including the Aempfast software. The supplied data set provides the description, or model, that is analyzed, so the Aempfast software referenced by the Examiner does not generate the model or data set being analyzed but receives it as input from a source and performs different analyses to evaluate the received model or data set.

To support this theoretical combination of a transmission-level model and a distribution-level model, the Examiner cites a portion of Optimal Technologies describing the mathematical complexity associated with determining control bus voltage. However, this statement makes no mention of transmission-level buses or distribution-level buses or integrating transmission-level buses and distribution-level buses, but merely provides a broad statement that calculation of control bus voltage is complex. Nothing associates this isolated mention of mathematical complexity with generation of any type of model, much less generation of a single mathematical model.

Further, it is respectfully noted reverse-engineering of a model by combining independently generated solutions does not necessarily produce the same results as application of a model generated by initially "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as claimed. Regardless of the difference in results, however, Optimal Technologies fails to disclose, or even suggest, the methodology described by the Examiner, but

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merely discloses techniques for analyzing a previously generated model that is received from an external source as a data set.

While the claimed invention specifically recites generating a single mathematical model by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," Optimal Technologies at most optimizes, or otherwise analyzes, resources described in a data file to determine characteristics of the data file. Contrary to the Examiner's allegations on page 13 of the Examiner's Answer, optimizing a data set merely calculates properties of elements in the data set and/or properties described by the contents of the data set, which may or may not describe a system and account for properties of the system. *See* Examiner's Answer, page 13. The optimization or analysis performed depends on the content of the data file, which is established independently of the optimization or analysis in Optimal Technologies.

In asserting that Optimal Technologies shows the integration of an entire power network and the modeling of all elements in the network the Examiner further cites one of the analysis techniques described on page 13 of Optimal Technologies describing ranking of additions to system resources. *See* Examiner's Answer, page 10 and page 13. However, this is an analytical technique where hypothetical "strategic" resources, not part of the system as originally modeled, are added to a specified model, and the effect of the hypothetical resources on the modeled system is determined. In contrast, the claimed invention describes generating a single mathematical model accounting for actual components in the power system by "integrating the

model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." Hence, the claimed invention generates the model describing the actually-implemented power network, and the performance of this generated model is later analyzed by addition of hypothetical resources. So, the cited portions of Optimal Technologies, as well as Optimal Technologies in its entirety, describe techniques for analyzing a model described by a received data set and is silent regarding generation of the model being analyzed.

Additional portions of Optimal Technologies referenced by the Examiner, for example, analyzing the "available real power (P) and reactive power (Q) resources at each and every bus of the system," also fail to disclose or suggest generating the model being analyzed, much less disclose "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as claimed. Rather, the specified portions of Optimal Technologies merely provide that multiple buses can be analyzed. The remainder of the disclosure of Optimal Technologies shows additional examples of analyzing a received data set and examples of reports generated by different types of analyses. Because the Aempfast software is an analytical layer applied to received data, unlike the claimed invention, it does not

generate the model used for analysis, but merely allows use of a variety of techniques for analysis of data received from an external source. (page 15, §4.1.1, ¶ 2; page 18, § 5.1, ¶1)

The Examiner also goes to great lengths to emphasize that analyzing a power network using load flow analysis is different than analyzing a power network using Aempfast. *See* Examiner's Answer, pages 11-12. However, this distinction is immaterial to the claimed element of "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." How a model is analyzed merely describes use of the model to obtain various attributes and does not describe or affect how the model is created or generated. The analysis techniques advanced in Optimal Technologies apply to a wide range of models supplied by an external data set and are described without reference to generation of a specific type of model, much less a single mathematical model integrating transmission-level buses, distribution-level buses and interdependency between transmission-level and distribution-level buses.

Regarding the Examiner's allegation that the additionally cited articles (Tersko, BusinessWire and MarketWire) "provide further evidence of the inherent single mathematical model of a power network," these additional articles provide no disclosure of the generation of a specific type of mathematical model by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of

transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as claimed. The mere fact that a certain result or characteristic <u>may</u> occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *See In re Rijcakert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); MPEP § 2112 (IV). Additional references cited by the Examiner to show inherency "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Inherency cannot be established by mere probabilities or possibilities, and the "mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999); MPEP § 2112(IV). The Tersko, BusinessWire and MarketWire articles do not satisfy this requirement, but merely list different data analysis capabilities that may be performed on a given data set by the Aempfast software. These disclosures of different types of analysis are unrelated to, and independent of, generation of the model being analyzed.

In revisiting the Tersko and BusinessWire citations, the Examiner again emphasizes portions of Tersko and BusinessWire describing the data analysis and report generation capabilities of the Aempfast software referenced in Optimal Technologies. Nothing in these citations provides additional insight or information about using the Aempfast software to *generate* a model. Rather, the Tersko and BusinessWire citations merely provide additional examples of analyses that can be performed using the Aempfast software and the level of detail provided by different analyses. While Tersko and BusinessWire provide benefits or advantages

to analysis using the Aempfast software, they do not address generation of the model or dataset analyzed by the Aempfast software.

The Examiner goes on to allege that Appellants "feign ignorance" of the Aempfast software and that is "unclear why Appellants have not chosen to demonstrate the Examiner's position as incorrect by easily providing evidence that Aempfast only uses 'conventional methods of modeling a power network." *See* Examiner's Answer, pages 17-18. In making these allegations, the Examiner references a MarketWire article from October 2002 including quotes from Appellants. However, the claims recite generation of a single mathematical model by integrating transmission and distribution elements while Optimal Technologies makes no disclosure of how a model being analyzed using Aempfast is generated. The additional evidence alluded to is unclear, as the Examiner has made no showing that Optimal Technologies discloses the claimed generation of a mathematical model.

Additionally, the MarketWire article both supports the distinction between the claimed invention and the Aempfast software, and indicates Optimal Technologies does not contemplate the claims.

The MarketWire article describes the combination of an analytical layer (the Aempfast software) for optimizing a power system model with a model-generation layer (the claimed method) which produces the model that is subsequently analyzed. The MarketWire article further provides that the Appellants attempted to use the Aempfast software to obtain additional insight about the functionality of the single mathematical model generated by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the

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transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." As described in the MarketWire article, the Aempfast software is used to analyze the model that has been produced by Appellants in accordance with the claimed method, by integrating transmission-level buses, distribution-level buses and the interdependency between transmission and distribution level elements. Nowhere does the MarketWire article disclose or imply that the Aempfast software generates the model that integrates transmission and distribution grids, merely that Aempfast has the performance capability to analyze large data sets. Arguably, the capabilities of Aempfast and the capabilities of the claimed methods must be distinct – and complimentary – for the combination of these approaches to have any merit. References to the project's integration of transmission and distribution grid in the MarketWire article are statements by the Appellant and are distinct from the description of Aempfast's analytical features.

Further, the project described by the MarketWire article is characterized as the "first of its kind in the world." This characterization suggests that and contrary to the Examiner's allegations, generation of a single mathematical model by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses" is not inherent in the Aempfast software and is not disclosed or contemplated in Optimal Technologies, which was published two years before the "first of its kind" project described by the MarketWire article. The project described in the MarketWire article employs the Aempfast software for use with a model, which in the

project described by the MarketWire article is a generated single mathematical model which integrates "the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." As indicated in the MarketWire article, this model is provided by the Appellants, and the Aempfast software was tasked to subsequently analyze the model. It is unclear why this combination of the Appellant's model generation method with Aempfast's analysis tools would be characterized as the "first-of-its-kind" if the Aempfast software itself generated the model being analyzed or that a model of the type contemplated for this project was in fact used or contemplated previously.

At most, the MarketWire article indicates that the Aempfast software is capable of optimizing a combined transmission and distribution network, but does not disclose or suggest that the combined transmission and distribution network is generated by Aempfast. Rather, the analyzed model is provided by the Appellants by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," as recited in the claims and in the provisional application. *See* U.S. Provisional Patent Application No. 60/411,836, pgs. 25, 30-35. After generation, the single mathematical model is subsequently analyzed using the Aempfast software. Nowhere

does the MarketWire software disclose or suggest that generation of the model being optimized is performed by the Aempfast software. As with the other references or articles cited by the Examiner, the MarketWire article merely provides that the Aempfast software has a variety of analytical tools capable of application to a variety of data sets, or models, received as input.

As noted above, the ability of a software program to analyze received data sets is not indicative of the software program generating a single mathematical model by "integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." While the Aempfast software described may be able to analyze a single mathematical model, the Aempfast software does not generate that single mathematical model, but relies on a data set or other input that is subsequently analyzed by a variety of .techniques.

Additionally, the Examiner ignores the priority date of the present application when citing the MarketWire article. The present application claims priority to U.S. Provisional Patent Application No. 60/411,836 filed on September 18, 2002, while the MarketWire article was published after this date in October 2002. In the MarketWire article, Appellants discuss the subject matter of the provisional application, and the portions of the MarketWire article emphasized by the Examiner are portions where the Appellants describe the content of the provisional application which formed the basis for the present application.

As an applicant's disclosure of his or her own work within the year before the application filing date cannot be used against the applicant, use of the MarketWire article to support the

Examiner's allegations is improper. *See* MPEP § 2132.01. The statements relied upon in the MarketWire article are clearly attributed to the Appellants, and were further made after the filing of the provisional application from which the present application claims priority. To compound the improper use of the MarketWire article, it also fails to remedy the deficient disclosure of Optimal Technologies.

None of the additional articles cited by the Examiner disclose or suggest that the software program described in Optimal Technologies generates a single mathematical model "by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses." At most, the additional references can be construed to provide that the software program in Optimal Technologies may be capable of analyzing a previously generated single mathematical model received as input.

Therefore, Optimal Technologies fails to disclose the claimed element of "generating a single mathematical model by integrating the model of the transmission-level buses with the model of the distribution-level buses, wherein the single mathematical model further models the interdependency of the plurality of transmission lines and the plurality of transmission electrical elements included in the model of the transmission level buses and the plurality of distribution lines and the plurality of distribution electrical elements included in the model of the distribution-level buses," but merely describes a software program capable of performing a

variety of analyses of a data set provided to the software program. Hence, Optimal Technologies fails to disclose each and every element recited in the claims.

Conclusion

For the foregoing reasons, Examiner's rejection of claims 1-14 and 19-20 was erroneous, and reversal of this decision is respectfully requested.

Respectfully submitted,

Peter B. Evans and Steven E. Schumer

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                                            Brian G. Brannon, Reg. No. 57,219
                                            FENWICK & WEST LLP
                                            801 California Street
                                            Mountain View, CA 94041
                                            Tel: (650) 335-7610
                                            Fax: (650) 938-5200
                                            bbrannon@fenwick.com